AMENDMENTS TO THE CLAIMS:

This listing of the claims will replace all prior versions, and listings, of the claims in this application.

Listing of Claims:

1. (Currently Amended) A receiver comprising:

a first input for coupling to a first receive antenna and a second input for coupling to a second receive antenna for receiving ~~at least two~~ spread spectrum symbols from a transmitter having at least a first transmit antenna and a second transmit antenna, ~~comprising:~~

a first data path ~~for generating~~ coupled to said first and second inputs and configured to generate a first estimated symbol $\hat{a}_1(f)$ received from the first transmit antenna ~~said first input~~;

a second data path ~~for generating~~ coupled to said first and second inputs and configured to generate an estimated symbol sum $\hat{a}_s(f)$ received from both the first transmit antenna and the second transmit antenna ~~said first and second inputs~~; and

an interference cancellation module having inputs coupled to the first and second data paths, said interference cancellation module ~~for canceling~~ configured to cancel co-channel interference (CCI) between the estimated symbol sum and the first estimated symbol to generate a second estimated symbol.

2. (Original) A receiver according to claim 1, wherein said first and second data paths each comprise a separate chip equalizer.

3. (Original) A receiver according to claim 2, further comprising a channel estimator having outputs coupled to inputs of each of said separate chip equalizers.

4. (Previously Presented) A receiver according to claim 1, wherein said second data path comprises a chip equalizer for generating an estimated chip sum sequence from said first and second inputs.

5. (Currently Amended) A receiver according to claim 1, wherein the interference cancellation module operates using less than all active spreading codes in ~~the~~ a system in which the receiver operates.

6. (Original) The receiver of claim 5, wherein the interference cancellation module operates using only spreading codes of estimated symbols that are output to a decoder.

7. (Currently Amended) The receiver of claim 1, wherein said receiver comprises a ~~LMMSE~~ linear minimum mean squared error receiver.

8. (Original) The receiver of claim 1, wherein the receiver comprises a Kalmann Filter receiver.

9. (Original) A receiver according to claim 1 wherein said second data path additionally comprises a unit for performing symbol detection of an estimated chip sum sequence to generate said estimated symbol sum $\hat{a}_s(f)$.

10. (Currently Amended) A wireless receiver comprising:

a first receiver input for coupling to a first receive antenna and a second receiver input for coupling to a second receive antenna for receiving a transmission from a transmitter having at least a first transmit antenna and a second transmit antenna, ~~comprising:~~

a channel estimator coupled to said first receiver input and said second receiver input, a first output, and a second output;

a first chip equalizer having a first input coupled to said ~~at least two receive antennas~~ first receiver input and to said second receiver input and a second input coupled to said first output of said channel estimator for suppressing inter-chip interference (ICI) and co-channel interference (CCI) ~~from at least one input other than said first input~~ due to the second transmit antenna and for generating an estimated chip sequence ~~from said first input~~ for a signal received from the first transmit antenna, said first chip equalizer having an output coupled to a first processing module ~~for descrambling and despreading~~ configured to descramble and despread the output of said first chip equalizer and ~~generating~~ to generate a first estimated symbol $\hat{a}_1(f)$;

a second chip equalizer having a first input coupled to said first receiver input and to second receiver input ~~inputs~~ and a second input coupled to said second output of said channel estimator for generating an estimated chip sequence sum ~~from said first and second inputs~~ for the signal received from the first transmit antenna and for a signal received from the second transmit antenna ~~and a residual CCI~~, said second chip equalizer having ~~an~~ a first output coupled to a second processing module ~~for descrambling and despreading~~ configured to descramble and despread the output of said second chip equalizer and ~~generating~~ to generate an estimated symbol sum $\hat{a}_s(f)$;

an interference cancellation module, having a first input coupled to receive said first estimated symbol $\hat{a}_1(f)$, a second input coupled to receive said estimated symbol sum $\hat{a}_s(f)$ and a third input coupled to a second ~~an~~ output of said second equalizer ~~as inputs~~,

an configured to cancel ~~for canceling~~ CCI and to generate ~~generating~~ at least one estimated symbol; and

a decoder ~~for decoding~~ configured to decode said at least one estimated ~~symbols~~ symbol .

11. (Previously Presented) A wireless receiver according to claim 10, further comprising a detector to detect a plurality of symbols of k users, said detected symbols being fed back to said interference cancellation module.

12. (Currently Amended) A wireless receiver according to claim 10, wherein said second chip equalizer generates a weighted sum of estimated chip sequences $d_s(f) = d_2(f) + b_{2,1}d_1(f) + n_2(f)$, where d_1 is an estimated chip sequence from ~~a~~ the first transmit antenna ~~first one of said at least two antennas~~, d_2 is an estimated chip sequence from ~~a~~ the second transmit antenna~~second one of said at least two antennas~~ and n_2 is a noise term.

13. (Currently Amended) A method, comprising: ~~of receiving a CDMA transmission in a wireless receiver having at least two receive antennas, said transmission comprising at least two symbols from a transmitter having at least first and second transmit antennas, comprising the steps of:~~

generating a first estimated symbol $\hat{a}_1(f)$ ~~from said first receive antenna~~ for a signal received from a first transmit antenna;

generating an estimated symbol sum $\hat{a}_s(f)$ ~~from said first and second receive antennas~~ for the signal received from the first transmit antenna and for a signal received from a second transmit antenna; and

determining a second estimated symbol by canceling interference between the estimated symbol sum and the first estimated symbol.

14. (Currently Amended) A method according to claim 13, ~~in which said step of~~ where generating an estimated symbol sum $\hat{a}_s(f)$ comprises equalizing ~~said~~ input data in an equalizer having optimized filter coefficients W^{opt} and feedback weights B^{opt} that are the solution to:

$$\mathbf{W}^{opt}, \mathbf{B}^{opt} = \arg\min_{\mathbf{W},\mathbf{B}} \mathrm{Trace}(\mathbf{R}_{zz}) = \arg\min_{\mathbf{W},\mathbf{B}} E\|\mathbf{B}^H \mathbf{d}_i - \mathbf{W}^H \mathbf{y}_{i+F:i-F}\|^2,$$
$$\text{s.t.} \quad \mathbf{B} = \begin{bmatrix} 1 & & 0 \\ \vdots & \ddots & \\ b_{M,1} & \dots & 1 \end{bmatrix}. \qquad (10)$$

where R_{zz} is an error covariance matrix, E is an error, W is a set of chip equalizers, and B is a set of feedback weights.

15. (Currently Amended) ~~A wireless receiver comprising a first input for coupling to a first antenna and a second input for coupling to a second antenna for receiving a spread spectrum transmission comprising at least two symbols from a transmitter having at least first and second transmit antennas in which not all spreading codes are known, comprising:~~

~~means for receiving an input data on a first data path for generating a first estimated symbol $\hat{a}_1(f)$ from said first input;~~

~~means for receiving said input data on a second data path for generating an estimated symbol sum $\hat{a}_s(f)$ from said first and second inputs~~

An apparatus, comprising:

means for generating a first estimated symbol $\hat{a}_1(f)$ for a signal received from a first transmit antenna;

means for generating an estimated symbol sum $\hat{a}_s(f)$ for the signal received from the first transmit antenna and for a signal received from a second transmit antenna;

means for utilizing said first estimated symbol $\hat{a}_1(f)$ and said estimated symbol sum $\hat{a}_s(f)$ as a plurality of inputs to an interference cancellation module, for canceling CCI and generating at least one estimated output symbol; and

means for decoding said at least one estimated output symbol.

16. (Currently Amended) The ~~wireless receiver~~ apparatus of claim 15 wherein said ~~first data path~~ means for generating a first estimated symbol comprises a first chip equalizer for generating an estimated chip sequence for the signal received from said first transmit antenna.

17. (Original) The wireless receiver of claim 15, further comprising an equalizer for equalizing said input data, said equalizer having optimized filter coefficients W^{opt} and feedback weights B^{opt} that are the solution to:

$$\mathbf{W}^{opt}, \mathbf{B}^{opt} = \arg\min_{\mathbf{W},\mathbf{B}} \mathrm{Trace}(\mathbf{R}_{zz}) = \arg\min_{\mathbf{W},\mathbf{B}} E\|\mathbf{B}^H \mathbf{d}_i - \mathbf{W}^H \mathbf{y}_{i+F:i-F}\|^2,$$
$$\text{s.t.} \quad \mathbf{B} = \begin{bmatrix} 1 & & 0 \\ \vdots & \ddots & \\ b_{M,1} & \cdots & 1 \end{bmatrix}. \qquad (10)$$

where R_{ZZ} is an error covariance matrix, E is an error, W is a set of chip equalizers, and B is a set of feedback weights.

18. (Cancelled)

19. (Cancelled)

20. (Currently Amended) A device comprising:

a receiver comprising a first input for coupling to a first receive antenna and a second input for coupling to a second receive antenna for receiving at least two spread spectrum symbols from a transmitter having at least a first transmit antenna and a second transmit antenna, comprising:

a first data path for generating a first estimated symbol $\hat{a}_1(f)$ for a signal received from the first transmit antenna ~~from said first input and comprising~~;

a second data path for generating an estimated symbol sum $\hat{a}_s(f)$ for the signal received from the first transmit antenna and for a signal received from the second transmit antenna ~~from said first and second inputs~~;

an interference cancellation module having inputs coupled to the first and second data paths, said interference cancellation module for canceling co-channel interference (CCI) between the estimated symbol sum and the first estimated symbol to generate a second estimated symbol; and

an equalizer for equalizing said first and second inputs, said equalizer having optimized filter coefficients W^{opt} and feedback weights B^{opt} that are the solution to:

$$\mathbf{W}^{opt}, \mathbf{B}^{opt} = \arg\min_{\mathbf{W},\mathbf{B}} \mathrm{Trace}(\mathbf{R}_{zz}) = \arg\min_{\mathbf{W},\mathbf{B}} E\|\mathbf{B}^H\mathbf{d}_i - \mathbf{W}^H\mathbf{y}_{i+F:i-F}\|^2,$$

$$\text{s.t.} \quad \mathbf{B} = \begin{bmatrix} 1 & & 0 \\ \vdots & \ddots & \\ b_{M,1} & \cdots & 1 \end{bmatrix}. \qquad (10)$$

where R_{zz} is an error covariance matrix, E is an error, W is a set of chip equalizers, and B is a set of feedback weights.

21. (Previously Presented) The device of claim 20 wherein said interference cancellation module operates using less than all active spreading codes in a system in which the receiver operates and using only spreading codes of estimated symbols that are output to a decoder.